

CLAIMS

We claim:

1. A DSL modem comprising:
 - 2 a bandwidth allocator adapted to dynamically adjust a bandwidth allocation based
 - 3 on voice channel demand, the bandwidth allocation defining a bandwidth
 - 4 for each of one or more voice channels and unchannelized data; and
 - 5 a formatter coupled to the bandwidth allocator, the formatter adapted to combine
 - 6 the voice channels and unchannelized data onto a digital subscriber line
 - 7 according to the bandwidth allocation, thereby creating a transmission
 - 8 signal.
1. The DSL modem of claim 1, further comprising:
 - 2 an off-hook detector coupled to the bandwidth allocator, the off-hook detector
 - 3 adapted to couple to one or more local customer premises voice lines for
 - 4 measuring voice channel demand thereon.
1. The DSL modem of claim 2, further comprising:
 - 2 a next-format storage coupled to the off-hook detector for storing a next
 - 3 bandwidth allocation, the next bandwidth allocation based on a detected
 - 4 change in voice channel demand.
1. The DSL modem of claim 1, wherein the transmission signal includes next
- 2 bandwidth allocation data, the next bandwidth allocation data defining an anticipated
- 3 bandwidth for the voice channels and data.
1. The DSL modem of claim 1, wherein the bandwidth for each voice channel is
- 2 associated with a timeslot in the transmission signal, the remaining transmission signal
- 3 bandwidth available for data.

1 6. The DSL modem of claim 5, wherein the bandwidth allocator is adapted to
2 adjust the bandwidth allocation at integer multiples of the periodicity of the timeslots.

1 7. The DSL modem of claim 1, wherein the formatter is adapted to format the
2 transmission signal into a series of superframes, each superframe including a plurality of
3 network frames, each network frame including a plurality of low-level frames, each low-level
4 frame including a plurality of timeslots, the timeslots containing a voice call or data.

1 8. The DSL modem of claim 7, wherein the bandwidth allocator is adapted to
2 adjust the bandwidth allocation at the frequency of the superframe.

1 9. The DSL modem of claim 7, wherein the network frames are synchronized to
2 a telephone-network timing reference.

1 10. The DSL modem of claim 1, wherein at least one voice channel includes voice
2 data selected from the group consisting of: voice data, facsimile data, analog modem data,
3 and digital service data.

1 11. The DSL modem of claim 1, wherein the DSL modem is a central office
2 modem.

1 12. A DSL modem comprising:
2 a DSL connection for transmitting information over a digital subscriber line;
3 a module coupled to the DSL connection for transmitting channelized data and
4 unchannelized data over the digital subscriber line, the module adapted to
5 dynamically allocate bandwidth for transmitting the channelized data
6 based on availability of channelized data, and to dynamically reallocate
7 unused channelized data bandwidth for transmitting the unchannelized
8 data.

1 13. A method of dynamically allocating bandwidth in a digital subscriber line
2 among channelized data from one or more local phone lines and unchannelized data, the
3 method comprising:

4 establishing a connection to a digital subscriber line;
5 allocating a portion of the bandwidth for each of the local phone lines in use, the
6 remaining bandwidth available for unchannelized data;
7 transmitting the channelized and unchannelized data over the digital subscriber
8 line in their respective allocated bandwidths;
9 detecting a change in phone line usage; and
10 reallocating the bandwidths among the local phone lines and unchannelized data
11 based on the detected change.

1 14. The method of claim 13, further comprising:

2 transmitting a bandwidth allocation over the digital subscriber line, the bandwidth
3 allocation defining bandwidths corresponding to the channelized and
4 unchannelized data.

1 15. The method of claim 13, wherein the bandwidths allocated for each of the
2 local phone lines in use are substantially equal and are capable of carrying a voice call.

1 16. A method of transmitting voice calls and digital data over a digital subscriber
2 line, the method comprising:

3 transmitting digital data over the digital subscriber line in a bandwidth;
4 detecting a new voice call;
5 responsive to the new voice call, dynamically reallocating a first portion of the
6 bandwidth to the voice call and a second portion of the bandwidth to the
7 digital data; and
8 combining the voice call in the first portion of the bandwidth and the digital data
9 in the second portion of the bandwidth for transmitting over the digital
10 subscriber line.

1 17. The method of claim 16, wherein the first portion of the bandwidth is outside
2 POTS band frequencies.

1 18. The method of claim 16, wherein the voice call includes data selected from
2 the group consisting of: voice data, facsimile data, analog modem data, and digital service
3 data.

1 19. The method of claim 16, further comprising:
2 responsive to the voice call's ending, reallocating the first portion of the
3 bandwidth to the digital data.

1 20. A method of dynamically allocating bandwidth among voice and data traffic,
2 the bandwidth comprising a plurality of timeslots, the method comprising:
3 allocating timeslots among the voice and data traffic;
4 composing a first superframe, the first superframe containing a plurality of
5 network frames, each network frame containing a plurality of low-level
6 frames, each low-level frame containing the voice and data traffic in their
7 allocated timeslots;
8 sending the first superframe over a digital subscriber line;
9 in response to detecting a change in the voice traffic demand, reallocating the
10 timeslots among the voice and data traffic;
11 composing a second superframe, the second superframe containing a plurality of
12 network frames, each network frame containing a plurality of low-level
13 frames, each low-level frame containing the voice and data traffic in their
14 reallocated timeslots; and
15 sending the second superframe over the digital subscriber line.

1 21. The method of claim 20, wherein composing the first superframe includes
2 synchronizing the network frames to a telephone-network timing reference.

1 22. The method of claim 20, further comprising:
2 sending a next allocation of the timeslots over the digital subscriber line to the
3 remote modem, the next allocation being encoded within the current
4 superframe.